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Audio/visual compilation in a data processing system.

A user/PC interface system is described which enables the creation and performance of a synchronised audio/visual story on the PC. The interface enables the initial storage of a plurality of visual images. Then, it enables the creation of an audio presentation which includes labels and time indications, certain of which are employed for synchronisation purposes. The system is responsive to a label to execute a predetermined command upon the appearance of the label in the audio presentation. The PC is then operated to perform the audio presentation, that performance automatically causing the display of visual images upon the occurrence of labels and time indications.

An improved, table-based authoring system is also described for preparation of both the above noted audio and visual presentations. The system relies upon columnar presentations of a tabular form, each column indicating a separate control function (or comment) relating to the audio/visual presentation.

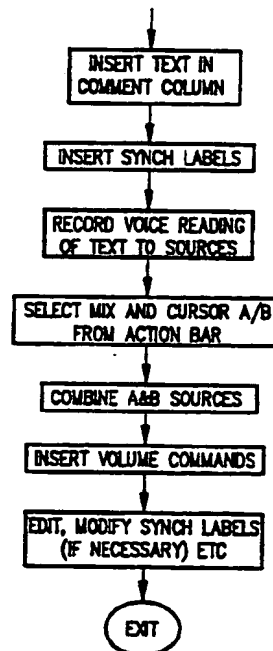


FIG. 16

## AUDIO/VISUAL COMPILATION IN A DATA PROCESSING SYSTEM

This invention to audio/visual compilation in data processing systems enabling computer-based production of audio/visual presentations, and seeks to improve the software-supported user interface for enabling a personal computer to produce and display an integrated audio/visual presentation.

As personal computers (PCs) have improved in processing capability, various application programs have been developed which enable the creation and display of audio/visual presentations. In the mid 1980's, the IBM Corporation marketed a PC application program entitled: "PC Storyboard" which enabled the preparation and display of colour presentations on an IBM PC. The PC Storyboard software was comprised of four program segments. A first segment, entitled: "Picture Maker", enabled the creation and modification of pictures in medium resolution graphics. Picture Maker included commands to write text, draw figures, generate charts and to cut and paste images between pictures. A second segment, "Picture Taker", was employed to capture picture images of scenes from other PC application programs. "Story Editor", was a third segment which enabled the PC user to organise pictures into presentations (stories). It provided for the selection of a variety of picture-to-picture transition methods that allowed one picture to dissolve into another. Variables such as display times, colours and whether the picture would be developed as a full picture or as a series of partial pictures, were also enabled by this software. Storyboard also included a segment entitled: "Story Tell", which enabled the presentation of stories assembled by the other software segments.

While Storyboard was, for its time, an acceptable product for the PC, it lacked a number of capabilities. It was essentially a visual presentation assembler and presenter; it lacked any significant capability for audio presentation assembly; for synchronisation of an audio presentation with the visual presentation; for interspersing during the presentation, commands which enabled logical and data processing interactions between the viewer and the PC; etc.

Recently, the increased use of windows, pull-downs, advanced cursor-selection techniques and other display-oriented, user interface instrumentalities have come into favour. These enable a PC user to directly interface with a PC's software and to control it largely from cursor-controlled screen selections. Substantial capability, colour presentation systems with synchronised audio have not, to the inventor's knowledge been made available for the PC market.

In addition to PC Storyboard, other prior art

has provided audio/visual, computer-based presentation capabilities. For instance, in U.S. Patent 4,712,180 to Fujiyama et al, a computer-assisted instruction system is described wherein audio and pedagogy information are compiled to produce a recording medium with an integrated mode of presentation. Various embodiments are described for integrating the audio and non-audio components of the presentation. In U.S. Patent 4,845,459 to Graf et al, the use is described of a library of images to produce improved quality "real-world" images for computer imagery. Lemelson, in U.S. Patent 4,848,172 describes a video presentation system wherein audio and video segments are combined to produce an integrated presentation. None of the above references teach a user-friendly interface which enables direct and simple methods for compilation of the presentations.

In U.S. Patent 4,748,994 to Ettlinger, an editing system is described wherein selected film segments may be spliced independent of picture and sound track sources and timing. The system provides a graphically arranged representation of the script of the work being edited, thus permitting the editor to preview and select segments of different "takes". This system attacks considerably different problems than those encountered in computer-based audio/visual presentations.

The present invention provides a method of creating and performing a synchronised, audio/visual story in a data processing system having audio and visual I/O, the method comprising: storing a plurality of visual images; compiling an audio presentation and including therein synchronisation indications so as to be invoked at predetermined times during the execution of the audio presentation; causing the system to execute the audio presentation; causing the system to invoke and execute a predetermined command in response to a synchronisation indication invocation in the audio presentation; and causing the system to display a selected stored visual image upon execution of the predetermined command.

Such an arrangement is thought to provide a computer-based audio/visual assembly and presentation system which efficiently exhibits visual presentations with synchronised audio.

There is disclosed hereinafter, by way of example, a user/PC interface which enables the creation and performance of a synchronised audio/visual story on the PC. The interface initially enables the storage of a plurality of visual images.

Then, it enables the creation of an audio presentation which includes labels and time indications, certain of which are employed for synchronisation purposes. Means are provided in the computer which are responsive to a label to execute a pre-determined command upon the appearance of a label in the audio presentation. The computer/software system is then operated to perform the audio presentation, that performance automatically causing the display of visual images upon the occurrence of labels and time indications.

It incorporates an improved, table-based authoring system is also described for preparation of both the above noted audio and visual presentations. The system relies upon columnar presentations of a tabular form, each column indicating a separate control function, comment, or other free form statement relating to the audio/visual presentation. This combination enables interactive processing with a user during the presentation and which is adapted to run on a PC and provides an audio/visual synchronised presentation system for a PC wherein intelligent interfaces on the PC screen enable a user to easily employ the system.

The present invention will be described further by way of example with reference to an embodiment thereof as illustrated in the accompanying drawings, in which

Fig. 1 is an illustration of the software segments used;

Fig. 2 shows a library table screen used;

Fig. 3 shows a library application table screen used;

Fig. 4 shows menus which are displayed when either Prompt or Process actions on a screen "action bar" are selected on a library application screen;

Fig. 5 shows menus which are displayed when either Edit or Inquire actions on a screen "action bar" are selected on a library application screen;

Fig. 6 shows the menus which are displayed when either Print, Exit or Help actions on a screen "action bar" are selected on a library application screen;

Fig. 7 illustrates a screen presentation of a first level library table showing various applications available to the audio/visual system;

Fig. 8 is a display of a "bill of materials" which appears on the screen when one of the applications shown in Fig. 7 is selected;

Fig. 9 is another "bill of materials" displayed on the screen and indicates the use of reference addressing;

Fig. 10 is a screen exhibiting the audio editor table;

Fig. 11 is a showing of the menus which appear when either the Prompt, Audio or Edit in-

dications in the "action bar" of Fig. 10 are selected;

Fig. 12 is a showing of the menus which appear when either the Mix, Controls or Print indications in the "action bar" of Fig. 10 are selected;

Fig. 13 is a showing of the menus which appear when either the File, Exit or Help indications in the "action bar" of Fig. 10 are selected;

Fig. 14 is a showing of an audio editor table which has been compiled to present an audio piece;

Fig. 15 and 16 are high level flow diagrams helpful in understanding the user/system interactions required to produce the table of Fig. 14;

Fig. 17 is a screen showing of a story editor table used;

Fig. 18 is a showing of the screen of Fig. 17 with the five right-most columns of the story editor table replaced with additional category columns;

Figs. 19-27 indicate the screen type line menus which appear for each column of the story editor table of Fig. 14;

Figs. 28-35 indicate sound type line menus which appear for each column of the story editor table of Fig. 14;

Fig. 36 is a showing of the menus which appear when either the Prompt or Tell actions are selected on the story editor table "action bar";

Fig. 37 is a showing of the menus which appear when either the Edit or View actions are selected on the story editor table "action bar";

Fig. 38 is a showing of the menus which appear when either the Print or File actions are selected on the story editor table "action bar";

Fig. 39 is a showing of the menus which appear when either the Exit or Help actions are selected on the story editor table "action bar";

Fig. 40 shows prompt tables which appear when the Prompt indication is selected on the story editor "action bar";

Fig. 41 shows AVA (audio/visual authoring language) functions which appear when the AVA functions line in Fig. 40 is selected;

Fig. 42 shows the AVA commands which appear when the AVA commands line in Fig. 40 is selected; and

Fig. 43 is a showing of a story editor print-out illustrating an audio/visual presentation.

It is to be understood initially that the invention may be configured from either software or firmware, either of which may be adapted to run on a PC, such as the IBM PS/2. As is known, most modern PCs are constructed to employ a bus structure with PC/subassembly communications taking place, in the main, over the bus or buses. Characteristically, a graphics capable PC is provided with an arithmetic/logic unit, random access

memory, various disk drives for storing quantities of readily available data, and a colour display including a keyboard. The display is adapted to show an image or images, along with a cursor (or cursors) which enable user selection of various software subroutines. All of the aforementioned structure is conventional and knowledge of its operation is assumed in the succeeding description.

Referring now to Fig. 1, the six major software segments of the invention are schematically shown. The overall program includes a library editor; image editor; digitise editor; convert editor; audio editor; and a story editor. During the course of the description, the digitise and convert editors will only be briefly referred to, whereas the others will be discussed in detail.

In brief, the library editor manages the retrieval, processing and storing of audio-visual "objects" (i.e., an "object" is an image, audio file or story used in the creation of an audio/visual presentation). The image editor is primarily used to add text and draw graphics onto images; to define special field types such as input or cursor actuation fields, and to do other image manipulations such as resizing or rotating. The digitise editor is used for converting video camera (analog) input images into computer digital form. These images are then stored as files in the PC where they become available for use in the audio/visual operation. The convert editor is used to modify cages captured by scanners or other image digitising systems and to convert them into a form usable in the audio/visual system of this invention. The audio editor enables the recording (digitising) and editing of sound. It also enables the insertion of time and other signals which are subsequently used to control the presentation of the story. The story editor assembles audio/visual presentations (called stories) and pulls together all of the data from the keyboard, files and various editors to present a completely synchronised, audio/visual presentation.

#### LIBRARY EDITOR

Each time the software system of this invention is initially operated, library editor is automatically invoked as the first editor accessed. The library editor provides access information on all objects within the software segments and their paths. The user selects a particular audio/visual object to work with (such as an image or a story), and then selects the type of processing to perform on the object (such as edit, digitise, convert, etc.). These choices automatically determine which of the other editors is to be invoked. Thus, the other editors are invoked according to the object and task selected rather than by an explicit editor name. The se-

lected object is automatically retrieved for the invoked editor at the same time the editor is activated, so that the object is present for use as soon as the editor comes on-line.

At the conclusion of processing by a respective editor, control returns to the library editor, with any object changes, now saved to disk. Once back in the library editor, the user can select either another object or object processing or can exit to other operations. Thus, movement to and from editors is normally routed through the library editor. In essence, the library editor is the "main menu" from where branching to all individual object editors occurs.

All objects, such as images, stories and audio files are listed in the library editor's displays. It is to be remembered that it is these object lists that are used by the system to cause various object editors to be invoked and it is the paths to the objects indicated in these lists that are used to control where objects are retrieved from and saved to.

While the library within the library editor contains information about various directories and objects, (e.g., type, name, description and path), it does not contain the directories or objects themselves. It essentially is an index which points to an object, wherever that object may reside within the system.

The term "application" will be used hereinbelow and it is meant to refer to a collection of objects grouped together in the library in a way that is meaningful to the user. An application may be a series of objects usable for a product presentation, an advertising message, or another audio/visual presentation. The application will have a name and be listed and accessed by that name. Furthermore, each application will have a secondary list embedded in it which, in addition to indicating the particular application, lists all of the various objects which are part of the application (i.e., a "bill of materials" for the application).

In the discussion below, a plurality of display screens will be described which enable the principal modes of interaction between the user and the system. Each screen presents a table, window, pull-down, action bar or combination thereof which provides for information feedback from the system to the user and vice-versa. Screens are generally provided with a plurality of cursor kinds (e.g., highlight bars, underlines, emphasis marks, etc.) to enable a user to know which portion of a screen is enabled for an input. Some cursor kinds automatically move on the screen (e.g., while a software segment is "playing",) or are moved by the user's actuation of a mouse, keyboard keys (e.g., right, left, up, down arrows, tab key, backspace, etc.) or other cursor control instrumentalities.

Turning now to Fig. 2, a first level library editor screen entitled "library table" is illustrated. This table lists the various applications and their names that are contained within the library editor. It forms the highest level directory to all subsidiary directories related to the various listed applications. An "action bar" 10 appears on line 1 of the screen and contains a number of action indications. The placement of a cursor at any listed action indication will invoke a pull-down with a listing of the available functions pertaining to the chosen action.

On line 3 of the screen, the term "library" indicates that this screen may be accessed by typing "library" followed by its particular name. Since the library editor can contain hundreds of listed applications, the combination of "library" with an application's name provides the system with the input necessary to identify the correct library screen. Assuming that the PC operates with a disk operating system (DOS), each library is physically one DOS directory.

The library table of Fig. 2 comprises a plurality of columns. The left-most column (FR) will have either an F or an R adjacent a line. F indicates the application is physically resident in the currently connected file. R indicates that the named file is located in another file not connected at the moment. The next column to the right "Type", defines the kind of file indicated on the line. In most cases the indication will be "application". The next column (headed by D:) indicates, if a D is present in a line, that the file is on a drive not presently on-line. The Name column indicates the assigned name of the application and the Comments column includes any descriptive comments regarding the file as well as a path indication if an R is present in the left-most column.

In Fig. 7, an example of a library table is shown with certain of its columns filled in. Note that all of the listed files are application files; that the last two application files are housed on drive e (which is not on-line); that the names of the files are as indicated; and that the adjacent comments describe, briefly, the subject matter of each application. For instance, Demo 1 presents the "current product line" as an audio/visual presentation.

Each line within a library table indicates the name and gross contents of the application. In order to determine the detailed contents of an application, the "application" table associated with the particular application must be accessed. This action will bring up for view, a "bill of materials" which lists all of the objects associated with the application.

An application table may be selected by placing the cursor on the line of the library table where it appears and selecting, from action bar 10, a processing action to perform (e.g., edit). when an

application is selected, the system retrieves an existing application from the file (or enables the creation of a new one, if that is desired) and then displays its corresponding application table screen which lists all images, stories, audio files, etc. associated with the application.

Turning to Fig. 3, a representative application table is shown. This table, as aforesaid, displays the contents of one specific application. Like the library table, the application table contains on its first line, an action bar 10 containing a number of indicated actions which, when invoked, cause the display of detailed pull-downs.

Line three contains the indication "application" along with the name of the application. The left most table column (FR) indicates if the object listed on the line is physically resident in this application. An F indicates the object is resident in the application file. If an R (for "reference") is shown, it indicates that the object listed is not physically resident in this application file. A reference to where that object is actually stored is found in the right-most columns of the table (i.e., D: Reference). There is inserted path information pointing to the location where the object is stored. A blank in the FR column signifies the line is a comment-only type line.

The Type column denotes whether the object is an image, audio, story or other object. The Name column contains a user-assigned name for the object. The column to the right of the Name column includes comments which describe something about the object to enable the user to recall its substance. For example, as shown in Fig. 8, an exemplary application table is illustrated having three image objects, two audio objects and one story object. Each image object has an assigned name (e.g. "Model 1") which enables that object file to be identified. A comment next to each object listing explains something about the object.

It is from an application table screen that access to the object editors occurs. while not shown, a cursor is present on the screen and is free to roam, under user control, from line to line and scroll from page to page. To process an existing object, the cursor is placed on the line for the object and an action from the action bar is invoked. This results in display of a pull down listing of available functions with the action classification. If then, a cursor is placed next to a function (e.g., "edit file") and a selection made, the proper editor program segment is accessed. For instance, the "edit file" action invokes the audio editor for an audio object, image editor for an image object, and story editor for a story object.

Turning to Figs. 4-6, the pull-downs (and related functions) which result from the invoking of one or more actions in action bar 10 are illustrated.

As shown in Fig. 4, a cursor indication placed at the Prompt location in action bar 10 and a user actuation of a Prompt-associated keystroke (e.g. by typing P) causes pull-down 12 to appear. This pull-down both shows and enables the available entries which can be made in the "type" column at a selected line in an application table.

Placing the cursor at the Process location in the action bar enables pull-down 14 to be displayed. If the cursor is then placed next to the "edit file" line and the ALT and E keys depressed by the user, an appropriate editor is selected as above described. This, then, enables the particular object listed in the application table to be appropriately altered by one of the editor program segments. The "run program" line is particularly related to a listed story object. The remaining listings shown in pull-down 14 are self-explanatory.

In Fig. 5, the Edit action pull-down is shown as well as the Inquire action pull-down. In Fig. 6, the Print, Exit and Help pull-downs are shown. Each of the lines within each of the pull-downs defines a particular task which is enabled upon the appropriate positioning of a cursor and selection of the task. For instance, in the Edit pull-down, placing a cursor next to the "undo" line and user depression of an Enter key removes the last edit change that affected the application table screen, such as an insert or a move.

Referring now to Fig. 9, an application table is shown having a number of referenced objects listed therein. As aforesaid, references allow objects to be associated with an application without physically residing in the same directory. For example, assume a user keeps all audio music stored in a single application/directory such as, MYAUDIO. This is attractive because all music is in one place for convenient access, maintenance and backup. If now, for various demonstration applications, different pieces of music are desired, there are a number of approaches possible to link the demonstration and the music together. The music could be physically copied into the different directories. This would be unacceptable as much duplicate storage and multiple copies would be required. Alternatively, the different demonstration stories could place specific path information with every "play" type statement. This would avoid storage duplication since the demonstration applications would still be using the original audio versions. However, if any software path change needed to be made to the MYAUDIO file (e.g., if it was placed on a different drive), all path entries on "play" statements related to the music would require finding and changing.

References in this invention work around these drawbacks by allowing an object to be listed in an application as if it were physically there. Path in-

formation is provided in the right-most column of the application table and redirects access to the application and file where the object is actually physically located. In Fig. 9, examples of referenced paths are shown. The referenced object, SKIING is listed as an image object. This enables any "show" statement in a story working from this application to use SKIING as an object name without requiring any special path designation - exactly as is done for any object physically stored in this application such as the file INTRO 1. At story run-time, when a play statement is encountered with SKIING, the program automatically causes the path "e:IMAGES 4" to be searched for the image object SKIING. Hence, while SKIING both can be played and edited when working from this application, the actual physical file is continually retrieved from and stored in the referenced application/directory e:IMAGES 4. Thus, only one path designation need be maintained for SKIING - the one on the object line in the application table - where SKIING is actually resident.

When applications being referenced all reside on-line, the benefit from the reference procedure is that duplicate storage is not needed - only one copy of an object need be maintained and other applications outside of the one owning the object can access it by pointing to it (referencing it). Another benefit is that these path references do not have to be repetitively entered and spread throughout for each object. Each application needs just one reference (path designation) per each object referenced. Thus, this enables one object copy to be accessed by all.

Once a user has fully assembled all of the objects required to produce an audio/visual presentation, the next action required is to assemble the audio portion of the presentation. This is accomplished in the audio editor.

#### AUDIO EDITOR

The audio editor is used to record, digitise, and edit sound. All work done with the audio editor is done through a columnar table displayed on the PC screen and shown in Fig. 10. Sound is handled in time lines of one second increments. A volume level is indicated for each sound line. Each line may also contain comments for annotation, sound controls for volume adjustment and labels for story synchronisation. It is also possible to have comment lines in the table without any accompanying sound. Such comment lines may be used to document full audio scripts. Edit action such as copy, lift, paste, insert and delete allow audio to be cut, reordered and spliced via software controls. A

zoom to tenths of a second facilitates extremely fine editing, if desired.

As with the previously table screens, the audio editor table of Fig. 10 includes an action bar 20 which is used to invoke various pull-downs and associated subroutines. The name of the current audio object in process is displayed following the audio A label. Audio B provides for a second channel of audio, and if in use displays the audio object B name. During the operation of the audio editor table, a background colour cursor 22 is employed and is enabled to scroll up or down in accordance with user actuated keyboard controls. During playing and recording, cursor 22 extends across the full width of the table and keeps pace, on a line for line basis, as music is recorded or played. At other times during the operation, only a portion of cursor 22 is used to indicate the particular column enabled for input from the user.

In the audio editor table, the left-most column "Playtime" contains a series of numbers from 0000 to 9999 to represent which second of sound is indicated. Seconds are numbered consecutively for all sound lines. Thus, any insertion or deletion of sound causes an appropriate renumbering of the column. In essence, the column gives an indication, from the beginning of Playtime to the end of Playtime, of the total number of seconds expended and, more particularly, an indication of each individual second. A line having no sound associated with it is a "comment only" line and 3 dashes are displayed in the Playtime field.

The "Sound" column field contains a plurality of squares sequenced left to right indicating the volume level of this sound second. Each square represents an additional level of volume. By referring to Fig. 14, examples of these squares in the sound column can be seen. The next column ("Synch Label") accepts a label which is adapted to be referenced in the story editor table (to be described below) as an audio point to synchronise on. In essence, a synch label may be a fundamentally fixed audio point to synchronise to, as contrasted to time values which are more relative in that they may change whenever an audio object has sound inserted or deleted. It is to be noted that not all synch labels are for system synchronisation, but may be used simply as prompts to enable the user to insert other sound or material in the audio track.

The comments column is used to identify musical pieces, sections, highlights, and to enter voice portions or written scripts. Thus, as cursor 22 scrolls downwardly in the audio editor table in time with line-by-line music play, the user is enabled to know when to commence insertion of voice-over portions. In addition, the exact script is highlighted by cursor 22 as it scrolls downwardly.

The right-most columns in the audio editor table enable the control of the sound's volume and duration time. The method column only accepts the entry "volume". A user may key this in, or select it from the prompt list (see Fig. 11). During play of audio, this column enables a volume change according to the parameters noted in the two columns to the right (volume and time). As shown in Fig. 11, (leftmost portion), the sound volume can be varied from zero percent to 100 percent and the time that it takes to move between volumes is indicated by the amount of time in the "time" column. Thus, a volume change can occur immediately (zero seconds), or can take up to ten seconds to change from one volume to another volume. The volume adjustments do not permanently affect the digitised sound unless the user elects to have them do so, in which case the user invokes the "mix" action from action bar 20 and further selects the "permanent sound mix" listing thereunder.

The screen display of the audio editor table may be divided into top and bottom sections, when set for a dual view of audio objects A and B (not shown). The top section scrolls audio object A, and the bottom section scrolls audio object B. The active cursor may be moved back and forth between the two sections via a cursor toggle action. When the active cursor is highlighted in one section of the split screen, the other section (the other object) has an "echo cursor" which tracks along in synchronisation. When the object with the active cursor is scrolled, by simply moving the cursor or performing an action such as, play, record, insert, etc., the other screen's cursor is normally scrolled in synchronisation. This, thus enables the two audio objects to be mixed by the user viewing these screens for synchronisation and control purposes.

Turning now to Figs. 11, 12 and 13, the pull-downs associated with the actions in action bar 20 will be briefly considered. The Prompt action has been described above under the Audio action. A pull-down displays a plurality of play commands which enable the playback of either an entire audio piece or a portion of a piece, the repeat of a piece or a specific time segment of a piece. For instance, the Play command causes the playing of an audio object starting at the current cursor location in the audio table. As play progresses, the highlight cursor keeps pace through the audio table, line by line. Lines with no sound associated with them (comment only lines) are skipped over. Play continues until either an escape key is depressed or the last line of audio is reached. The re-record entry in the Audio action pull down enables additional recordings to be made of audio objects.

Edit actions, as indicated in the associated pull-down, enable a reversal of the last entry (undo)

that affected the audio. The copy, lift and paste functions require the use of a buffer to temporarily store the material being altered while it is being operated upon, in accordance with the desired stated function. For instance, the paste command takes material from one portion of the table and puts it in another portion of the table. In Lift, the block to be "lifted" is placed in the buffer and is deleted from the audio table.

The remaining functions shown in Figs. 12 and 13 are employed to enable alteration of the entries in the audio editor table for the purpose of creating a continuous audio object which can either be played alone or combined with a story as an integrated presentation.

As shown in Fig. 12, the Mix, Controls and Print actions in action bar 20 enable various mixing functions to be carried out between A and B sound sources; enable various controls to be "manipulated" with respect to sound volume and balance; and enable the printing of all or a portion of the audio editor table. In Fig. 13, the File, Exit and Help actions respectively enable the writing to disk of one or more audio selections; the exiting from the program upon certain conditions and the accessing of help subroutines which enable the user to overcome encountered problems.

#### AUDIO AUTHORIZING

Referring now to Figs 14, 15, and 16, the preparation of an audio editor table for an actual presentation will be described. As shown in the flowchart of Figs. 15 and 16, the user initially enters the library editor; selects an application, and then selects an audio object. The Process action in the action bar is then selected and the associated pull-down appears with the "edit file" function indicated. That function is selected and causes the audio edit table to be displayed. At this stage, the user selects the sound source (either A or B channel), places the cursor at the audio object name in the table and invokes the Audio action bar and its associated pull down appears (see Fig. 11). By then placing the cursor at "play from beginning and depressing the Alt and G keys, playing of the audio object commences.

At the beginning of the audio object play, the audio editor table is the blank table as shown in Fig. 10. As the audio object commences play, cursor 22 begins to scroll, on a second by second basis, down the table. The music then plays in second by second increments, the seconds are sequentially marked and volume indications of the sound are inserted in the sound column.

All of the above actions are noted in the audio table - see Fig. 14 where an example of an actual

presentation is shown. Wherever there is no sound, three dashes are inserted in the play time column. (Some of the seconds indications have been removed from the chart of Fig. 14 for brevity's sake.)

The music chosen to play is "Anchors Away" and is enabled to play for 22 seconds as an introduction to commentary. At the 20 second time line, an insert is made to the sound control columns to indicate that the volume is to decrease to 20% over a two-second period. Play then continues at the 20% level until the termination of the piece or an earlier time (e.g. second 42).

At the end of the audio piece, the user moves the cursor to where the voice over text is to be inserted. The text may then be typed into the comment area or it can be directly recorded. Additionally, synch labels may be inserted in the synch label column for the purpose of user prompting or to provide a control signal for a story editor table (described below). In Fig. 14, at second 34 it is desired to cause a specific "show" to occur, synchronised with the inserted commentary. Thus, a synch label NORD is inserted which can then be referenced by the story editor table as a control function. The remaining synch labels are prompts for the user to know when certain actions are to take place during the running of the audio table. For instance, the term "fleet" is the cue to commence the recording of the first comment line shown in the comment column. The subsequent label "shore party", enables the user to know that a picture of a group of sailors will be shown at this point during the presentation.

As shown in Figs. 15 and 16, once the synch labels are inserted, volume commands can also be inserted and the voice-over recorded in the audio B area. Subsequently, the A and B audios can then be mixed to create a single audio record and the synch labels and volume commands modified, if necessary, to cause the correct balance of sound between the background music and the voice-over.

#### STORY EDITOR

Story editor is used to assemble audio/visual presentations (i.e. a story). A story defines the sequencing and display of images and the synchronisation of the audio. Data input from the keyboard and data outputs to the screen and to files are also controlled by the story editor. To build a story, story editor employs an authoring language called AVA (Audio/Visual Authoring language) and a specification table that is very much like that used with PC Storyboard. The AVA language adds an interactive and data processing capability to the invention that was not available in PC Storyboard. Overall, the AVA language has some 60 instruc-

tions available for use. A listing of the AVA statements, functions and commands is illustrated in Figs. 40, 41 and 42. It should be noted that the AVA language is largely based on REXX, (Restructured, Extended Executor) a command language used in IBM products. That language is defined in "System Product Interpreter Reference", Second Edition, Dec. 1984, IBM publication number SC245239-1.

When displaying images in the story, either the entire image can be displayed all at once or just a portion. Timing specifications in the story control how long images display, how long the transition takes from one image to another, and synchronisation between images and audio. Synchronisation originates with the audio editor, to which the story editor responds. Stories can be set to test, at run time, for the occurrence of an event e.g. a user's actuation of a cursor field. Such fields are defined on images (such as around icons or key text words) and result in a special indication when selected by a cursor or mouse at story run-time. In this fashion, a screen of icons can be displayed for selection and upon user response, the story can determine which icon was selected and then act (i.e. branch) accordingly.

Referring now to Fig. 17, a story editor table (no. 1) is illustrated. In Fig. 18, story editor table No. 2 is illustrated and it will be noted that only the right-most four columns differ from that of table 1. In essence, the story editor table is comprised of 11 columns; however only 7 columns can be shown in one display screen, while the remaining four columns need to be relegated a second screen (Fig. 18).

Each column of the story editor table has assigned to it, a preset number of character positions. Ordinarily, entry of data in one column is restricted to the preset number of assigned characters. If an attempted entry is made of a greater number of characters, the "overage" characters are neither displayed nor accepted. If it is desired to insert a statement or comment which exceeds the number of character positions available in any column, the insertion of a slash followed by an asterisk in the first two character positions of a line overrides all subsequent column character limitations and enables text to be inserted for the full length of the line.

To enable ease of movement between columns, tab codes are emplaced at the first character position of each column so that by depression of a tab key, the cursor can be incremented across a line on a table from the first character position of a column to the first character position of the next column etc. If however, the cursor is in the first character position of the right-most column (size) of the table shown in Fig. 17 and the tab key

is pressed, the table shown in Fig. 18 is automatically displayed in place of table of Fig. 17. It is to be noted that the left-most two columns of both tables are identical.

The story editor tables shown in Figs 17 and 18 use a cursor which is represented by a bright flashing underscore that appears under whatever character position the cursor is currently located at. In addition, a colour band entirely fills the background of the field within a line being addressed. In many cases, a column and a field are synonymous. For example, if the cursor is in the time column, only that field on the current line has a background colour bar. when the current line is an AVA statement type line, the background colour bar extends across the entire colour line i.e., across all columns, as such a statement is enabled to extend across the entire line in one continuous string.

As above stated the story editor table uses a two section screen since the story table is too wide to fit on a single screen. The screen shown in Fig. 17 is the one normally displayed. The right four columns shown in Fig. 18 are used when working with display coordinates of partial image portions. As above stated, when the table of Fig. 17 is displayed, and the cursor is in the right most column (SIZE column) the depression of the keyboard tab key to cause the cursor to move to the initial character position of the next column in the story table (IMAGE, X, Y) simultaneously causes the screen to change to display the table shown in Fig. 18. The action also occurs when a last character entry in the size column is followed by a right arrow key depression causing the next column filed to be ready for data input.

Whenever the story table is displayed, the table is enabled for entry. Thus, wherever the cursor is positioned at the moment, the depression of a character key on the keyboard causes that character to be inserted at that spot. The left-most column (Statement) will contain one or more commands from the AVA language. If the line is a screen-type line, the commands will generally be one of show, paste, clear or colour. If the line being inserted into the table is an audio type line, the command will generally be play. These commands can be seen in Fig. 42 along with the other AVA commands available for use in the system. If a command is inserted in the Statement column, followed by the name of an image, it is that image which is commanded to be displayed. The clear command causes the screen to go to black and the paste command, followed by an image name causes one image to be superimposed over a previously shown image. The play command for a sound type line causes an audio object, whose name follows the command, to be played.

Along the top of the columns in the story editor

tables, there are two lines, one labelled "screen" and the other "sound". Depending upon the particular command found in the Statement column, one or the other of the screen or sound lines is enabled. Thus, if a play statement exists in the Statement column, it is the sound line which is active, whereas if a show statement is present in the Statement column, the screen line is active for the line on which the show command is employed.

For lines where screen type statements are present, the Method column determines the dissolve technique used to bring the image referred to in the current line onto the screen. An entry to this field, and to the remaining fields in the story editor table can be keyed in, rotated in, or selected from the pull-down list shown in Fig. 19. As will be seen from a review of the various methods of display, a number of techniques are available to cause a picture to move on or move off a screen. For instance, the checker method involves the current image being brought onto the screen in a series of random boxes in a checkerboard appearance. The explode method causes the current image to be unfurled onto the screen in four directions simultaneously, etc.

The Dir column determines the direction of a dissolve method e.g. up, down, right, left, etc. (See Fig. 20). The next column to the right i.e. Line, provides a colour line along an incoming edge of the current image to separate it from the prior image that is being overlayed or moved off the screen. This entry enables the colour of that line to be chosen. The Time column entry determines the amount of time the dissolve method is to take from the start of the display to its completion. The time values which can be chosen are shown in Fig. 22 and vary from immediate to 8 seconds.

The Wait entry column determines the amount of time that processing is to wait, after completion of a current dissolve, until it advances to the next story line. Wait values can be a time value (in seconds and tenths of seconds), an audio synchronisation label or time indication, the term "input" which requires waiting for input responses, a user actuated enter signal, etc. The possible entries here are shown in Fig. 23. The term key causes processing to stop after completing the dissolve and to wait until a key (cursor or any other key) is depressed. An inserted time value causes the processing to stop for that specific length of time. Once the inserted time has expired, the processing proceeds onward to the next story line automatically. When A or B is at the start of a wait entry, it indicates to wait for an audio synchronisation point, either from audio channel A or channel B. If the A or B is followed by a number, then the audio synchronisation point is a time value - that many seconds or tenths of seconds into the audio file.

The time value is measured from the very beginning of the audio file, not from where the audio started playing. If the A or B at the start of the wait entry is followed by a character entry instead of a numeric value, then the entry is interpreted as audio synch label. At run time, these labels are equated to time values by the story editor. Thus, waiting for an audio synch label is identical to waiting for an explicit audio time, except the user has the convenience of using a label reference instead of having to try to remember a particular time value. For instance, an entry of "A Horn" specifies a wait until the synch point in the audio file named "horn" is reached. This column enables the visual portion of the presentation to be very precisely synchronised with the audio presentation.

The next column i.e. Size, determines whether the dissolve method image for the image object named on the current line is to be full screen or only for a part of the screen. As shown in Fig. 24, two choices are available i.e., full or part. If part is chosen, then entries are required in one or more of the three right-most columns in Fig. 18. Image X, Y column determines where the upper left corner of the partial display area is to come from off the current image. For example, an X, Y entry of 20, 30 would position the upper left corner of the partial view at a position 20% across the screen from the left edge and 30% down from the top edge. Entries in the WIDTH, HIGHT columns work exactly in the same fashion as is used for the Image X, Y coordinates. The difference is that these coordinates define the Width and Height respectively of the partial area. For example, an entry such as 30, 40 defines a partial area that is 30% of the screen size wide and 40% of the screen size in height. These dimensions are relative to the upper left corner of the partial area defined in the Image X, Y column. The Screen X, Y column works in the same fashion as used for the Image X, Y coordinates. The difference here however is that these coordinates define the upper left corner where the partial area is actually to be displayed on the screen. For example, an entry such as 80, 60 defines a partial target area that has its upper left corner, X coordinate at a position 80% across (from the left edge) and its upper left corner, Y coordinate 60% down from the top of the screen.

As can now be seen, for a screen type line, entries in the columns of the story editor table enable the method of presentation image to be totally defined, including its method of presentation and dissolve, its duration of presentation, etc. Similar entries, where a sound-type line is present, enable a sound object to be accordingly edited.

For a sound type line, the Method column has three possibilities, fade in, fade and fade out (shown in Fig. 28). The term "fade", fades up the

sound at its inception and fades down the sound at its completion. "Fade-in" just controls the commencement portion of the sound, and "fade-out" controls the termination portion of the sound. The channel column enables selection of one or the other of channels A or B (see Fig. 29). The Volume column enables an entry (Fig. 30) to be inserted (for a play statement) to set the volume level for the respective play activity. The Time column entry (for sound type lines) determines the amount of time the audio dissolve methods of fade, fade in or fade out take. As shown in Fig. 31, a number of adjustments are available to these presentation methods. The Wait column entry determines the amount of time that processing is to wait after completion of a current play statement, until it advances to the next story line. Wait values can be a time value, in seconds, etc., an audio synchronisation point, the term INPUT (which requires waiting for input responses and an entry actuation), the term TRIGGER which defines waiting for a cursor field to be activated etc.. The Wait column functions are similar for sound type lines as for screen type lines and operate much the same as described above for screen type lines.

The Size column entry determines whether the playing of an audio file is to be from the very start to the very end of the file (full), or whether the playing is to start and end at other points in the file (part), (see Fig. 33).

The Sound Beg column entry applies only to a play statement such as PLAY followed by the name of an audio object. It allows the specific start point to be designated - one that can be other than the start of the audio file. The entry may be an audio file synch label or a time in seconds and tenths of a second. The Sound End entry works in exactly in the same fashion as for Sound Beg except it designates where to stop playing the audio file. These are shown in Figs. 34 and 35.

Turning now to Figs. 36-39 the various action bar functions associated with the story editor table will be briefly discussed. Many of the functions are identical to those used with the audio editor table. The Prompt action has been considered above and will not be further described here. The Tell action (Fig. 36), is a command which begins the telling of a story, starting at the current cursor location in the story table. Tell generally continues until the last line of the story is reached, a stop statement or break point is reached or an escape key is pressed. As soon as Tell reaches a first screen type line, it searches upwardly in the story table until it encounters a show or paste statement that has an image name associated with it. This provides the starting Image display so that display of the screen-type line on which Tell resides, can be done with whatever image-to-image transition

method is currently in effect for this line. Next, Tell determines what Image to display for the current line. If the current line, screen-type statement has an explicit file name or variable name, then that is used. If it does not, then the same image used for the starting display becomes the display for this line. Tell then continues to sequence down the story lines executing the commands as found. The remaining Tell actions of Fig. 36 are self explanatory and will not be further described here.

The Edit actions (see fig. 37) enable an entered story line to be altered, copied, etc. as determined by the user. The View action commands enable various portions of either a source image or target image to be selected for alteration or provide the ability to modify the image while listening to the audio or edit the image with the audio.

The Print, File, Exit and Help actions shown in Figs. 38 and 39 are further actions available to the user to perform the indicated functions.

Figs. 40, 41 and 42 as aforesaid, show the various table prompts usable in the creation of a story table. As shown in Fig. 41 and 42, a multiplicity of various functions and commands are available for insertion in the story table to enable logical and arithmetical processing to occur during the play of a story. Furthermore, these functions and commands enable interactivity to be inserted into the story, so that it awaits a user's reaction to a portion of the story before it will proceed, branch or otherwise alter its presentation.

## STORY AUTHORING

Turning now to Fig. 43, a story table is illustrated which, in combination with the audio table shown in Fig. 14 enables the presentation of a synchronised audio visual presentation. Note that comments are inserted on lines 1-3 and 16-18, with the "/" enabling the comments to overwrite the column division lines.

The story begins on line 11 of the story file with a showing of an image labelled "Intro". The column insertions on line 11 indicate that the image fades in with the fade occurring from right to left and the fade taking 0.5 seconds to occur. The full image entitled "Intro" is shown.

At line 12, a command to load the image "sailors" is executed and then, on line 13, the command to "wait" for the depression of a key is found. Upon the user depressing a key, the cursor moves to line 19, and immediately causes play to commence of the Retail 1 audio file from channel A, at 100% volume. The "A 2" entry in the Then Wait column indicates that an audio synchronisation point of 2 seconds into the Retail 1 audio file is to be used as the time to move the cursor in Fig.

43 to line 20 and to perform the next command.

At the synchronisation point A 2, the cursor moves to line 20 and the system executes the command "show ALLBLACK" which image is brought to the screen using a fade which occurs over a two second interval (see time column). The ALLBLACK image is held in place for 0.5 seconds and the cursor then proceeds to scroll to line 21. There the show command "navyhat" is executed using a checker type of presentation to present the image, with one second then being waited until the cursor is scrolled to line 22. The "Show Sailors" command causes the "Sailors image to be displayed using an "explode" technique, with the image coming into the centre from a vertical direction. A red broader line appended to the image is commanded by the entry in the Line column, and the entry "6" in the time column indicates that it will require six seconds for the full image to be developed. The Sailors image stays in place until the 21st second of time is sensed from the A audio channel ("A 21" entry in the "then wait" column).

Story editor lines 23-26 continue as shown. At line 27, the screen goes to black using a stripe presentation which occurs over 0.8 seconds. Then, the entry in the "Then, wait" column of A NORD indicates that only upon the occurrence of the NORD synchronisation label from the retail 1 audio file shown in Fig. 14, will the presentation be allowed to continue. Upon that synchronisation label being sensed, a logo is then shown (see line 29) using a partial view as defined in the four right most columns of the story file. The presentation ends as defined in lines 30-32.

It can thus be seen that through the use of the audio editor table and the story editor table, a user is enabled to construct a synchronised, audio/visual presentation. Then, during run time, the PC operates to sequentially access the statements in conjunction with the playing of the audio file to present the story.

## Claims

1. A method of creating and performing a synchronised, audio/visual story in a data processing system having audio and visual I/O, the method comprising:  
storing a plurality of visual images;  
compiling an audio presentation and including therein synchronisation indications so as to be invoked at predetermined times during the execution of the audio presentation;  
causing the system to execute the audio presentation;  
causing the system to invoke and execute a predetermined command in response to a synch-

ronisation indication invocation in the audio presentation; and  
causing the system to display a selected stored visual image upon execution of the predetermined command.

2. A method as claimed in claim 1, further comprising the steps of:  
displaying a table;  
playing an audio work and entering in the table, time notations indicating the elapsed time of play of the work; and  
detecting the time notations as a synchronisation indication.

3. A method as claimed in claim 2, further comprising entering certain the synchronisation indications in the table at positions recognised by the computer/software system as cues to activate a story action.

4. A method as claimed in claim 3, further including entering into the table, volume control commands to enable volume changes in the audio work.

5. A method as claimed in claim 4, wherein the table is provided with a list of allowed actions performable on the audio presentation, only a listed allowed action being enabled in response to user selection thereof.

6. A method as claimed in any preceding claim, wherein compiling includes:

playing an audio sound track;  
displaying continuing sound indications of the audio sound track along one dimension of the editor screen, accompanied by discrete time of play indications;

inserting synchronisation labels adjacent the sound indications and time-of-play indications on the screen when a visual display is to be shown; and  
employing the screen insertions to provide control signals, such control signals operating to enable performance of visual presentation commands.

7. A method as claimed in claim 6, further including inserting volume control indications in the screen to modify the volume of the audio sound track.

8. A method as claimed in claim 7, further including enabling edit functions to be performed on the audio sound track through user interactive function commands displayed on the screen.

9. A method as claimed in claim 8, further comprising inserting narrative text adjacent the play indications and time-of-play indications on the screen when the narration is to occur;

10. A method as claimed in any of claims 1 to 5, wherein the compiling comprises:  
entering a series of command statements in the tabular screen to show images and play audio;  
entering in the tabular screen adjacent certain commands, time indications from an audio presentation;

providing control means responsive to a signal from a time indication to enable performance of a command statement; and  
playing the audio presentation and using the control means to enable performance of the command statements in accordance with the time indication signals.

11. A method as claimed in claim 10, further including:

entering synchronisation labels in the tabular screen adjacent certain command statements; and  
causing the control means to be responsive to the synchronisation labels to enable the performance of a subsequent command statement.

12. A method as claimed in Claim 11, further comprising:

entering in the tabular screen adjacent certain command statements, display alteration indications; and  
providing display control means responsive to the display alteration indications to perform the indications when the command statement is executed.

13. A method as claimed in any of claims 10 to 12, wherein the tabular screen has columns which function as inputs for both audio and screen functions, the software having screen related commands and audio related commands, the method further comprising:

entering control inputs into a line in certain of the columns; and

recognising the control inputs as audio control inputs if an audio related command is present on the line, or as a screen control input if a screen command is present on the line.

14. A method as claimed in Claim 13, further comprising inserting a command in the tabular screen to delay further processing until a user response is received.

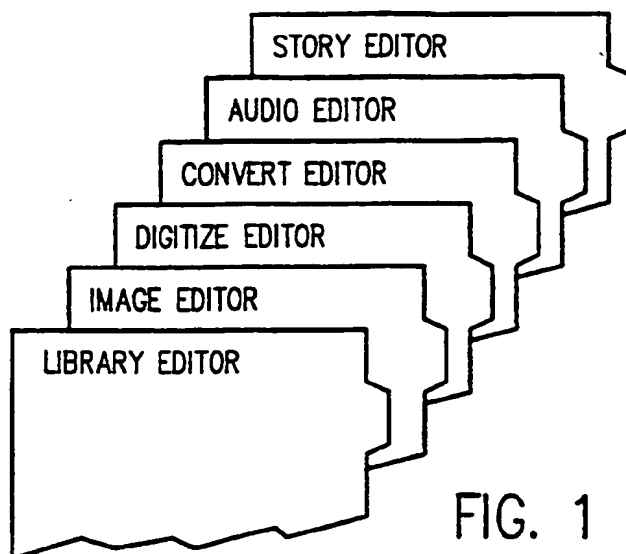
15. A method as claimed in claim 14, further comprising inserting a command to perform a non-screen, non-audio process and to await its completion until proceeding with further commands.

16. A data processing system adapted to the method as claimed in any preceding claim and including logic displaying a tabular presentation of the story, the tabular presentation including a column for command statements, columns for visual presentation function indications, and columns for synchronisation labels and time indications; logic enabling a user to insert in the tabular presentation the command statements, synchronisation labels and time indications and to select and insert the visual presentation functions; and logic responsive to the running of the story presentation to present the visual images in accordance with the the function indications, time indications and synchronisation labels inserted in the tabular presentation.

17. A system as claimed in claim 16 including logic preventing typed character inputs proceeding

from one column to another column; format logic including tab indications for a first character position in each the column, and limiting the number of characters in each column; logic responsive to an entry in one the column of a predetermined indication, to inhibit the prevention means and to de-enable the format means, whereby a string of characters may be inserted by a user in a line, which string runs through a plurality of columns.

18. A system as claimed in claim 17, wherein the number of columns exceeds the number of columns which can be shown in a display screen, further comprising logic means responsive to an entry in a right-most column shown on the display screen to display a new screen containing non-displayed columns.



LIBRARY EDITOR

LIBRARY TABLE

#1  
#2  
#3  
#4  
#5  
#6  
#7  
#8  
#9  
#10  
#11  
#12  
#13  
#14  
#15  
#16  
#16  
#17  
#18  
#19  
#20  
#21  
#22  
#23  
#24  
#25

PROMPT PROCESS EDIT INQUIRE PRINT EXIT HELP

LIBRARY: XXXXXXXXXXXX

FR	TYPE	D: NAME			COMMENTS

(F=FILE, R=REFERENCED FILE, D=DEFAULT DRIVE)

FIG. 2

## LIBRARY EDITOR - APPLICATION TABLE

PROMPT PROCESS EDIT INQUIRE PRINT EXIT HELP

APPLICATION: XXXXXXXXXXXX

FR	TYPE	NAME			D: REFERENCE	

(F=FILE, R=REFERENCED FILE, D=DEFAULT DRIVE)

FIG. 3

LIBRARY EDITOR -

APPLICATION ACTION BAR

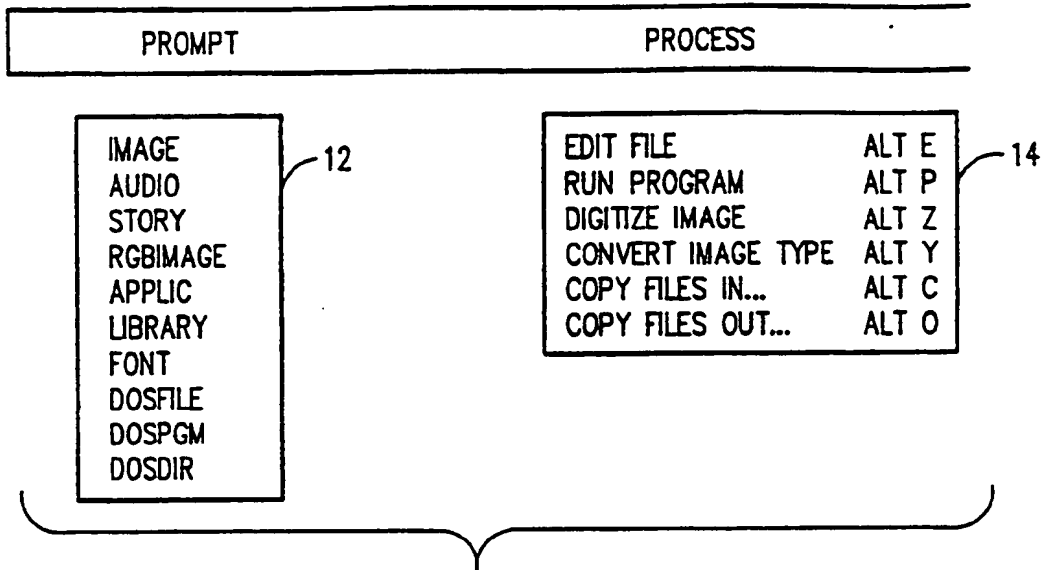


FIG. 4

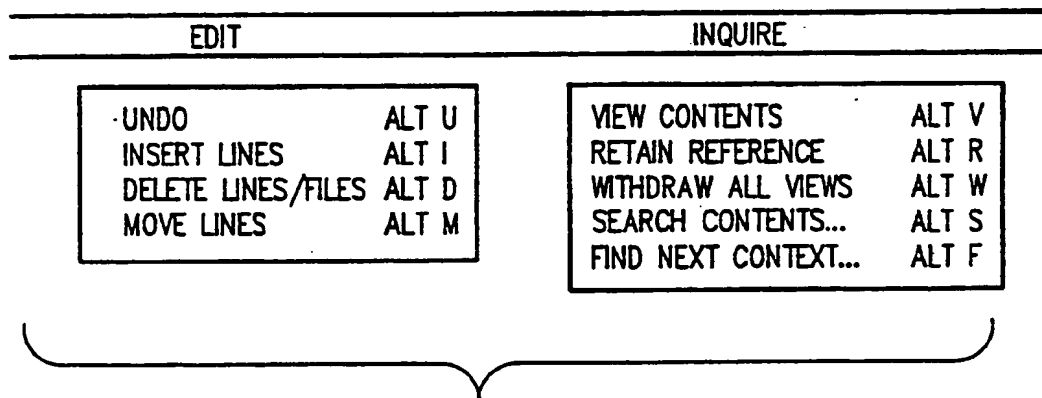


FIG. 5

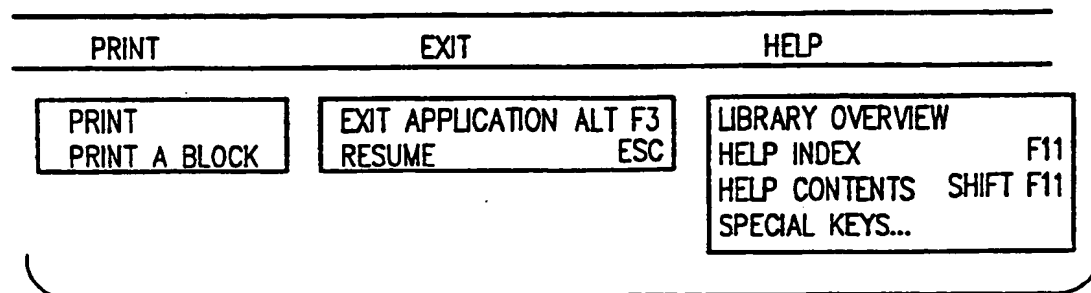


FIG. 6

## LIBRARY EDITOR -

LIBRARY TABLE

TYPE	D:	NAME	
APPLIC		DEMO1	PRESENTS CURRENT PRODUCT LINE
APPLIC		DEMO2	PRESENTS PLANNED NEW PRODUCTS
APPLIC		MYAUDIO	GENERAL PURPOSE MUSIC
APPLIC		MYIMAGES	GENERAL PURPOSE PICTURES
APPLIC	E:	DEMO1BU	BACKUP
APPLIC	E:	DEMO2BU	BACKUP

FIG. 7

APPLICATION TABLE

FR	TYPE	NAME	
F	IMAGE	MODEL1	ENTRY COST
F	IMAGE	MODEL2	INTERMEDIATE
	IMAGE	MODEL3	(IMAGE NOT YET OBTAINED)
F	AUDIO	OPENING	DIFFERENTIATE THE MODELS
F	AUDIO	CLOSING	SUMMARIZE ADVANTAGES
F	STORY	DEMO1	SHORT DEMO VERSION

FIG. 8

APPLICATION TABLE

FR	TYPE	NAME		D:	REFERENCE
R	IMAGE	SKIING	COUPLE ON A LIFT CHAIR	E:	IMAGES4
R	IMAGE	BIKING	WOMAN IN RACING SUIT	E:	IMAGES4
R	IMAGE	JOGGING	MAN ON A TRACK	E:	IMAGES4
F	AUDIO	INTRO1	WELCOMING SPEECH		
R	AUDIO	STARWARS	OPENING THEME	F:	AUDIO3
R	AUDIO	PEANUTS	PIANO RENDITION	F:	AUDIO3
R	STORY	DEMO1	MAIN CONTROLLING STORY		DEMO1

FIG. 9



## AUDIO EDITOR - ACTION BAR

PROMPT		AUDIO		EDIT	
METHOD					
VOLUME					
VOL	TIME				
100 %	0 SEC.	PLAY	ALT Y	UNDO	ALT U
95 %	.5 SEC.	PLAY AGAIN	ALT A	COPY	ALT C
90 %	1 SEC.	PLAY A BLOCK	ALT B	LIFT	ALT L
85 %	2 SEC.	PLAY FROM BEGINNING	ALT G	PASTE	ALT P
80 %	4 SEC.	RECORD	ALT R	INSERT LINES	ALT I
75 %	5 SEC.	RERECORD	ALT O	DELETE LINES	ALT D
50 %	8 SEC.	AUTO-SCROLLING...	ALT S	ZOOM...	ALT Z
0 %	10 SEC.				

FIG. 11

MIX		CONTROLS		PRINT
CURSOR A/B...	ALT +	MASTER VOLUME/BALANCE...		PRINT
VIEW...	ALT V	SOUND CONTROL...		PRINT A BLOCK
BACKGROUND PLAY	ALT K	SOURCE LINE...		
MARK SYNCH POINT	ALT M	MONITOR RECORDING...		
PERMANENT SOUND MIX..				

FIG. 12

FILE	EXIT	HELP
SAVE ALL ALT F4	SAVE ALL AND EXIT ALT F3	AUDIO OVERVIEW
SAVE A	SAVE A AND EXIT	HELP INDEX F11
SAVE B	SAVE B AND EXIT	HELP CONTENTS SHIFT F11
CREATE NEW A...	EXIT WITHOUT SAVING F3	SPECIAL KEYS...
CREATE NEW B...	RESUME ESC	
GET A		
GET B		

FIG. 13

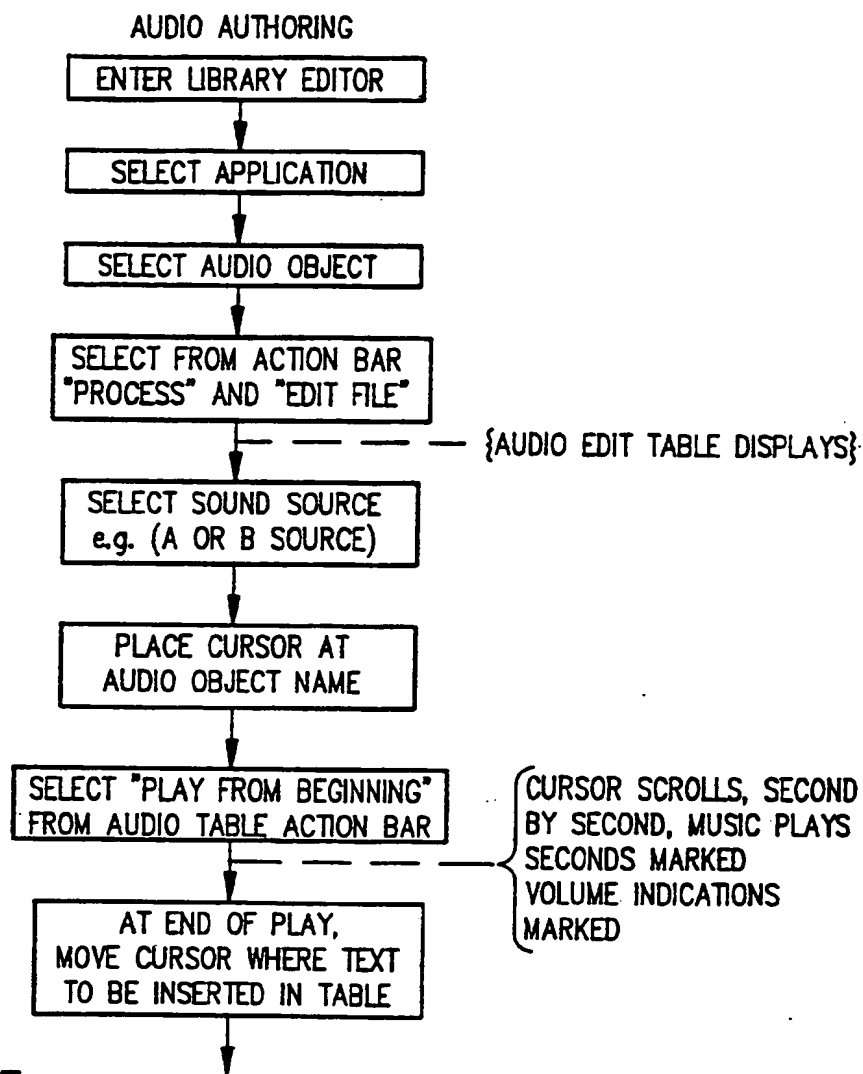


FIG. 15

TO FIG 16

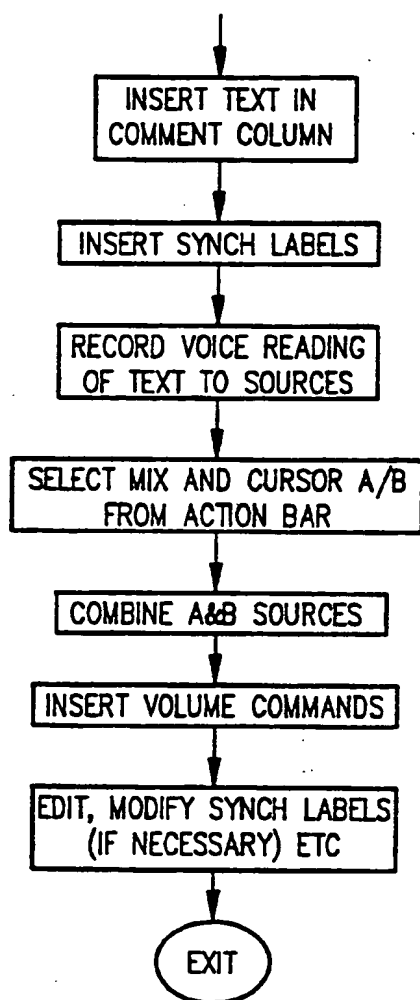


FIG. 16

PROMPT TELL EDIT VIEW PRINT FILE EXIT HELP

## תחת of תחת

STATEMENT	SCREEN SOUND	METHOD METHOD	DIR CHANNL	LINE VOL	TIME TIME	WAIT WAIT	SIZE SIZE

#1  
#2  
#3  
#4  
#5  
#6  
#7  
#8  
#9  
#10  
#11  
#12  
#13  
#14  
#15  
#16  
#16  
#17  
#18  
#19  
#20  
#21  
#22  
#23  
#24  
#25

PROMPT TELL EDIT VIEW PRINT FILE EXIT HELP

nnn of nnn

[illegible]

FIG. 18

METHOD
CHECKER
CRUSH
DIAG
EXPLODE
FADE
FADEIN
FADEOUT
MOVE
MOVEON
MOVEOFF
PUSH
REPLACE
SPLIT
STRIPES
WEAVE

FIG. 19

DIR
UP
DOWN
RIGHT
LEFT
IN_H
IN_V
OUT_H
OUT_V

FIG. 20

LINE
BKGRND
BLACK
BLUE
CYAN
GREEN
MAGENT
RED
WHITE
YELLOW
NONE

FIG. 21

TIME
FAST (0)
MEDIUM (2.5)
SLOW (5)
0
0.5
1
2
4
8

FIG. 22

WAIT
KEY
0
0.5
1
2
4
8
INPUT
TRIGGER
CHANNEL A...
CHANNEL B...

FIG. 23

SIZE
FULL
PART

FIG. 24

IMAGE X,Y
00.0 00.0
25.0 25.0
50.0 50.0
75.0 75.0

FIG. 25

WDTH,HGHT
25.0 25.0
50.0 50.0
75.0 75.0
100 100

FIG. 26

SCREEN X,Y
00.0 00.0
25.0 25.0
50.0 50.0
75.0 75.0
SAME SAME

FIG. 27

METHOD  
FADEIN  
FADE  
FADEOUT

FIG. 28

CHANNL  
A  
B

FIG. 29

VOL  
0  
20  
40  
60  
80  
100

FIG. 30

TIME  
FAST  
MEDIUM  
SLOW.  
0  
0.5  
1  
2  
4  
8

FIG. 31

WAIT  
KEY  
0  
0.5  
1  
2  
4  
8  
INPUT  
TRIGGER  
CHANNEL A...  
CHANNEL B...

FIG. 32

SIZE  
FULL  
PART

FIG. 33

SOUND BEG  
...LISTS  
AUDIO  
SYNCH  
LABELS

FIG. 34

SOUND END  
...LISTS  
AUDIO  
SYNCH  
LABELS

FIG. 35

## STORY EDITOR - ACTION BAR

PROMPT	TELL
...LIST BASED ON STORY COLUMN CURSOR IS IN, LENGTHY LISTS USE SCROLLING	TELL ALT T TELL AGAIN ALT A TELL A BLOCK ALT B TELL FROM BEGINNING ALT G STEP ALT S STEP A BLOCK ALT O BREAKPOINT ON/OFF ALT K

FIG. 36

EDIT	VIEW
UNDO ALT U COPY ALT C LIFT ALT L PASTE ALT P INSERT LINES ALT I DELETE LINES ALT D FIND STRING ALT F	PARTIAL SOURCE ALT X PARTIAL TARGET ALT Y VIEW IMAGE/HEAR AUDIO ALT V EDIT IMAGE/AUDIO ALT E

FIG. 37

PRINT	FILE
PRINT STORY PRINT A BLOCK	SAVE ALT F4 CREATE NEW... ALT F5 GET AND COPY ALT F6

FIG. 38

EXIT	HELP
SAVE AND EXIT ALT F3 EXIT WITHOUT SAVING F3 RESUME ESC	STORY OVERVIEW HELP INDEX F11 HELP CONTENTS SHIFT F11 SPECIAL KEYS...

FIG. 39

## STORY EDITOR

## TABLE PROMPTS

PROMPT (AVA STATEMENT)
ALL OBJECTS...
STORY OBJECTS...
IMAGE OBJECTS...
AUDIO OBJECTS...
AVA FUNCTIONS...
AVA COMMANDS...

FIG. 40

## AVA FUNCTIONS

ARG(	/*	number option
ASK()		
COMPARE(	/*	FIELD, FIELD, pad
DATE(	/*	option
DELSTR(	/*	FIELD, pos, len
DEIRECTORY(	/*	directory
FIND(	/*	FIELD, TEXT
FINISH(	/*	FILENAME
HEND()		
HRUN(	/*	FUNCTION
HSEND(	/*	CODE, MESSAGE
HSETTING()		
HSTART(	/*	APPLICATION
INSERT(	/*	TEXT, FIELD, pos, len, pad
LASTPOS(	/*	TEXT, FIELD, pos
LENGTH(	/*	FIELD
MAX(	/*	NUMBER, number
MEMORY()		
MIN(	/*	NUMBER, number
OVERLAY(	/*	TEXT, FIELD, pos, len, pad
POS(	/*	TEXT, FIELD, pos
READ(	/*	FILENAME, offset
SEEK(	/*	FILENAME, offset
SIZE(	/*	FILENAME
SUBSTR(	/*	FIELD, pos, len, pad
TIME()		
TRUNC(	/*	FIELD, decimals
WRITE(	/*	FILENAME, FIELD, option

FIG. 41

## AVA COMMANDS

CALL  
CLEAR  
COLOR  
DO  
DROP  
ELSE  
END  
EXIT  
IF  
INPUT  
ITERATE  
LEAVE  
LOAD  
NOP  
PARSE  
PASTE  
PLAY  
PROCEDURE  
RELEASE  
RETURN  
SAY  
SELECT  
SIGNAL  
SHOW  
TELL  
THEN  
TRACE  
UPPER  
UNTIL  
WAIT  
WHEN  
WHILE

FIG. 42

STORY FILE NAME: RETAIL1

LIN NUM	STATEMENT	SCREEN--> SOUND----	METHOD	DIR CHANNEL	LINE VOL	TIME	THEN WAIT	SIZE	SRC X,Y SOUND BEG	WDTH,HGHT SOUND END	DST X,Y
1	/*										.
2	/*										.
3	/*										.
:											.
11	show INTRO		FADE	RIGHT		0.5	0	FULL			.
12	load SAILORS										.
13	wait key										.
14											.
15											.
16	/*										.
17	/*										.
18	/*										.
19	play RETAIL1			A	100	0	A 2	FULL			.
20	show ALLBLACK		FADE			2	0.5	FULL			.
21	show NAVYHAT		CHECKER			-2	1				.
22	show SAILORS		EXPLODE	IN_V	RED	6	A 21				.
23	play vol			A	0	2	A 23				.
24	play vol			A	70	0	0				.
25	show BEACH3		CRUSH	IN_V	BLUE	2	1				.
26	load LOGO										.
27	clear black		STRIPES	IN_V	NONE	0.8	A NORD				.
28											.
29	show LOGO	/logo	CRUSH	OUT_H	NONE	1	1.4	PART	9.5,56.2	82.0,38.7	SAME,SAME
30	show	/date	SPLIT	OUT_V	YELLOW	0.7	1.4	PART	16.7,13.7	66.7, 9.5	.
31	show	/time	SPLIT			0.7	1.4	PART	21.7,23.3	56.7, 8.7	.
32	show	/pct.	SPLIT			0.7	1.4	PART	29.8,32.5	37.1, 8.7	.

FIG. 43